



Sources of Cost Overruns in Mega Projects

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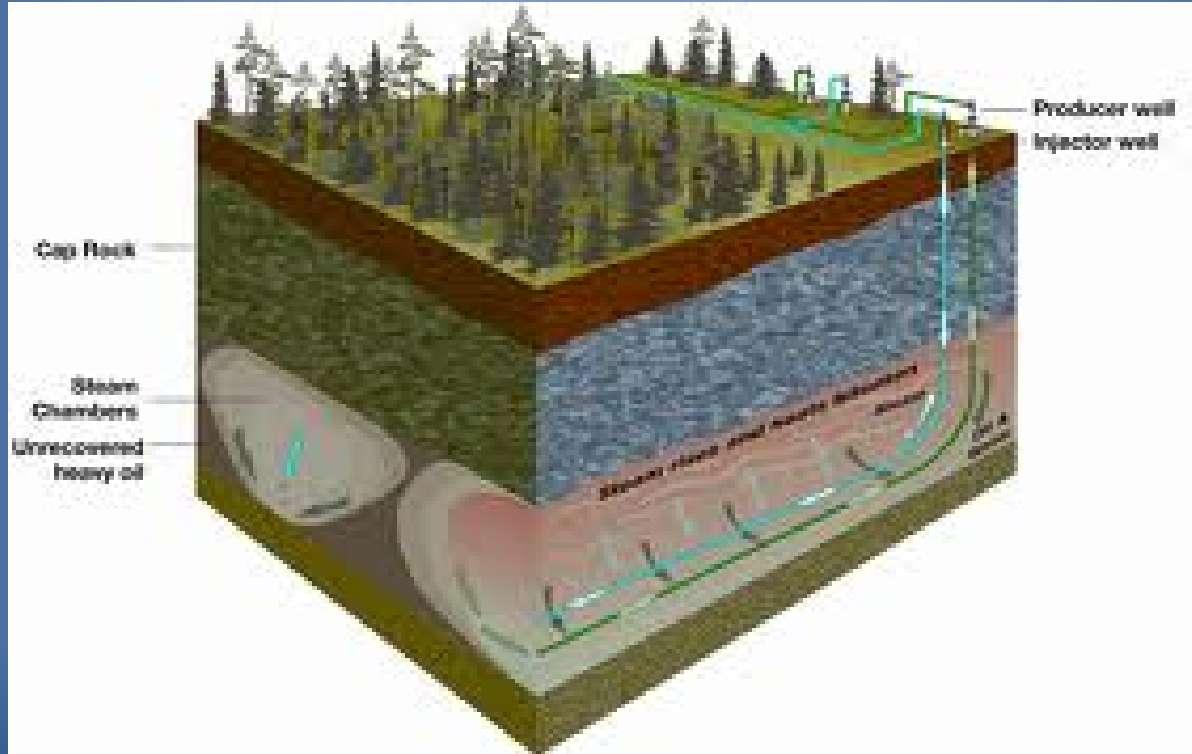


Drivers of Cost-Overruns in Mega Projects

Key Drivers of Mega Project Cost Variance	
1. Failure to Complete FEL	60 – 85% of variance
2. Escalation	Up to 12%
3. Regulatory Regimes	Up to 12%
4. Plant Complexity	Up to 20%
5. New Technology	Up to 20%
6. Solid Feedstock	Up to 10%
7. Complex Ownership	Up to 24%

Key Factors Influencing Risk of Mega Project Failure	
1. Concurrent Detailed Design & Construction	0.5 – 4x greater risk
2. Non-Integrated Project Team	Up to 3x greater risk
3. Contractual Risk Misallocation	Up to 2.5x greater risk
4. Fast-Tracking Projects	Up to 2x greater risk
5. Lack of Internal Capacity	Up to 2x greater risk
6. Oil and Gas Industry	Up to 2x greater risk
7. Brownfield vs. Greenfield Site	No impact on risk**

Cost Over Runs in Alberta Oil Sands



There is no intrinsic reason why projects in
Alberta are more prone than projects
elsewhere
to over budget.

Why does this notion persist?



Alberta Mega Project Cost Overruns: Fact & Fiction

- Mega Project cost variance is not related to:
 - Location
 - Geography
 - Regulatory regime
- Main cause of cost variations:
 - **Internal processes and planning**
- “Alberta” risk premium perception:
 - Is perception based in fact?
 - Does it apply to all projects in Alberta?

Specific Reasons for Cost Overruns in Oil Sands Projects

Reasons for cost overruns for Oil Sands Projects:

1. Public Perception
2. Reporting Bias
3. Loss of Internal Capacity
4. Escalation and Self Inflicted Escalation
5. Frontier Culture
6. New Technology
7. Feedstocks
8. Partnering



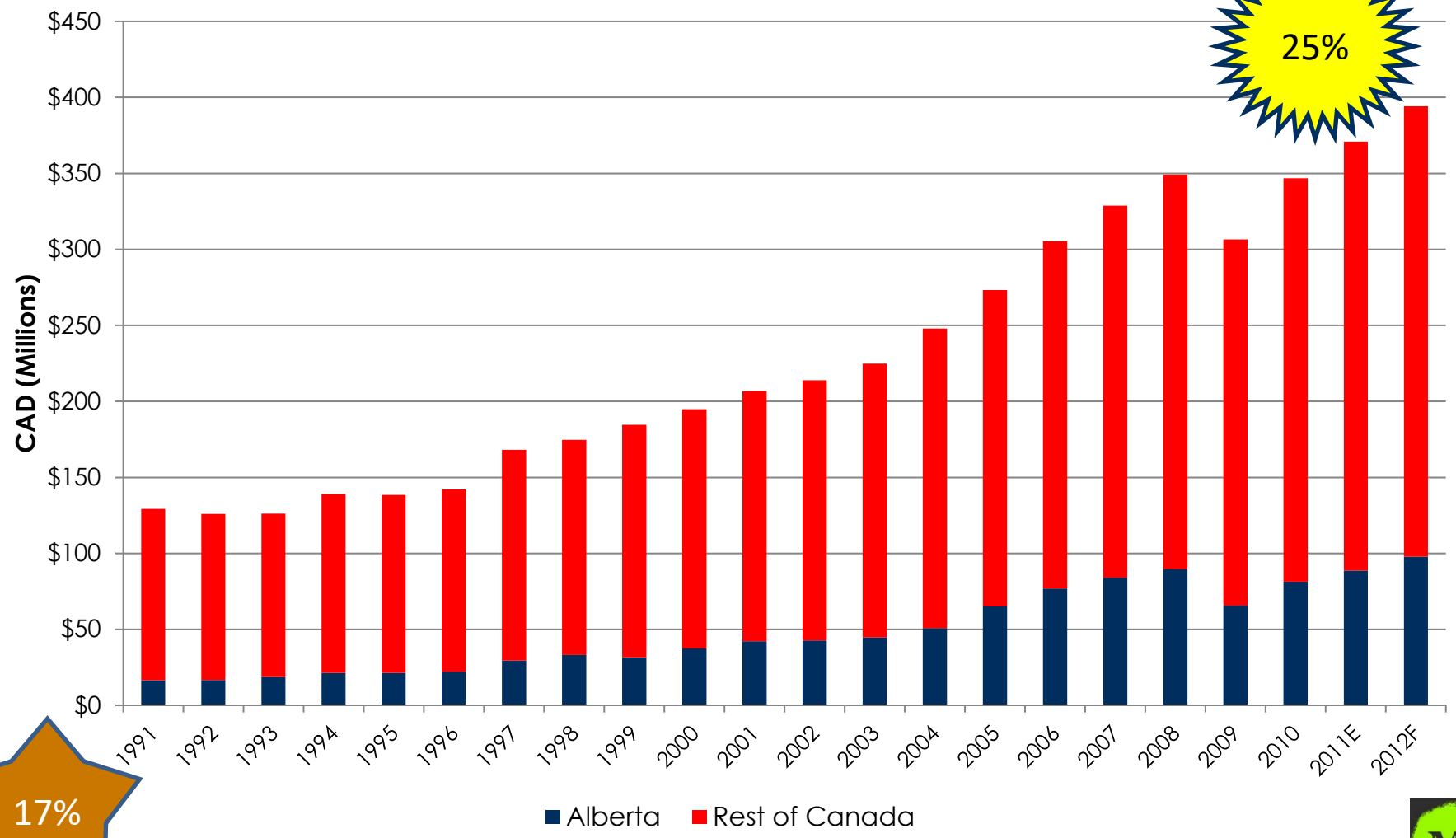
1. Public Perception

- Oil Sands do go over!
- Average cost over is between **61% to 107%** (1999-2011)
 - Fails to tell the whole story for Oil Sands
 - Fails to tell the story for other capital projects in Alberta



1. Public Perception

Total Capital Expenditures Alberta vs. Other Canada



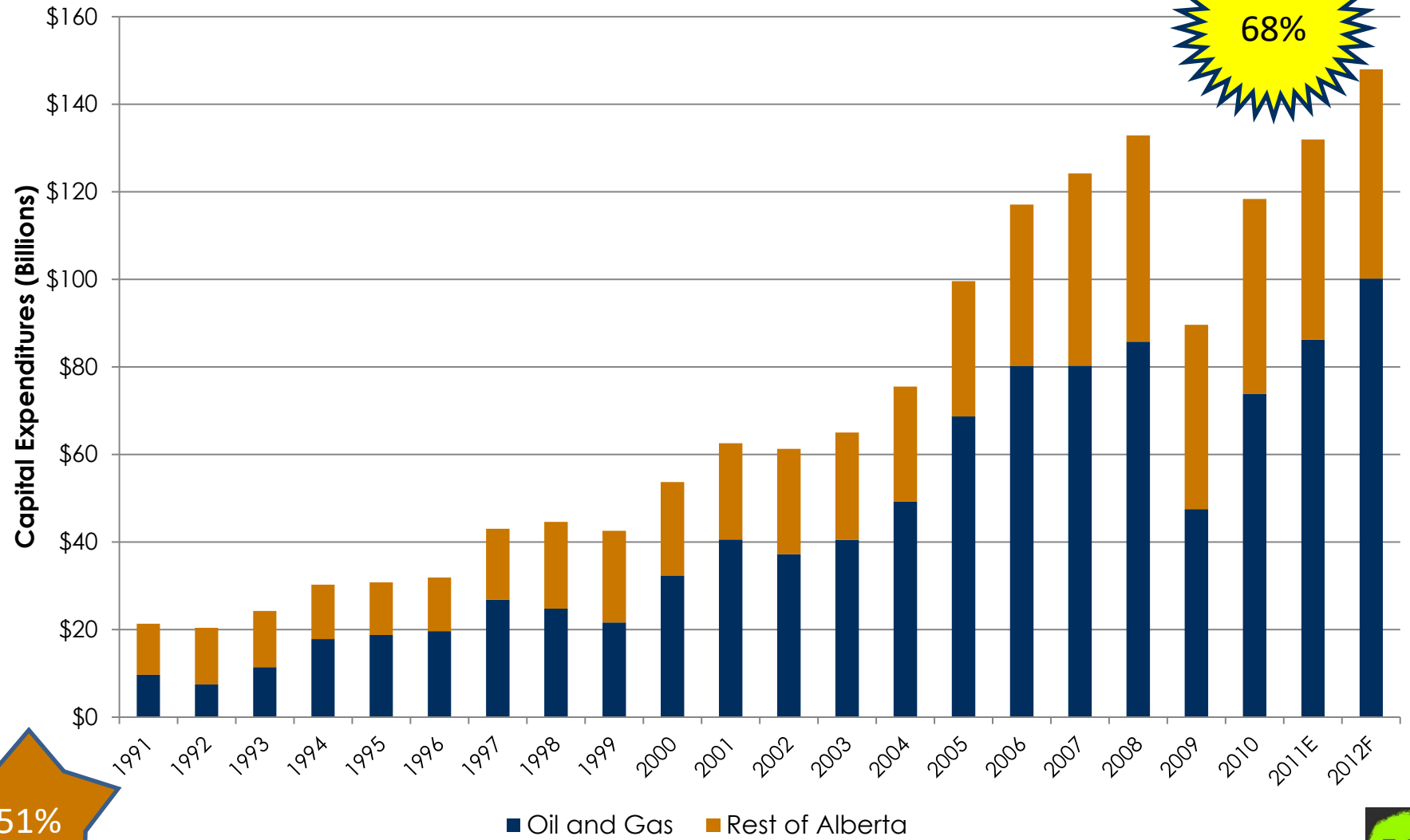
25%

17%



1. Public Perception

Oil and Gas vs. Other Sectors in Alberta



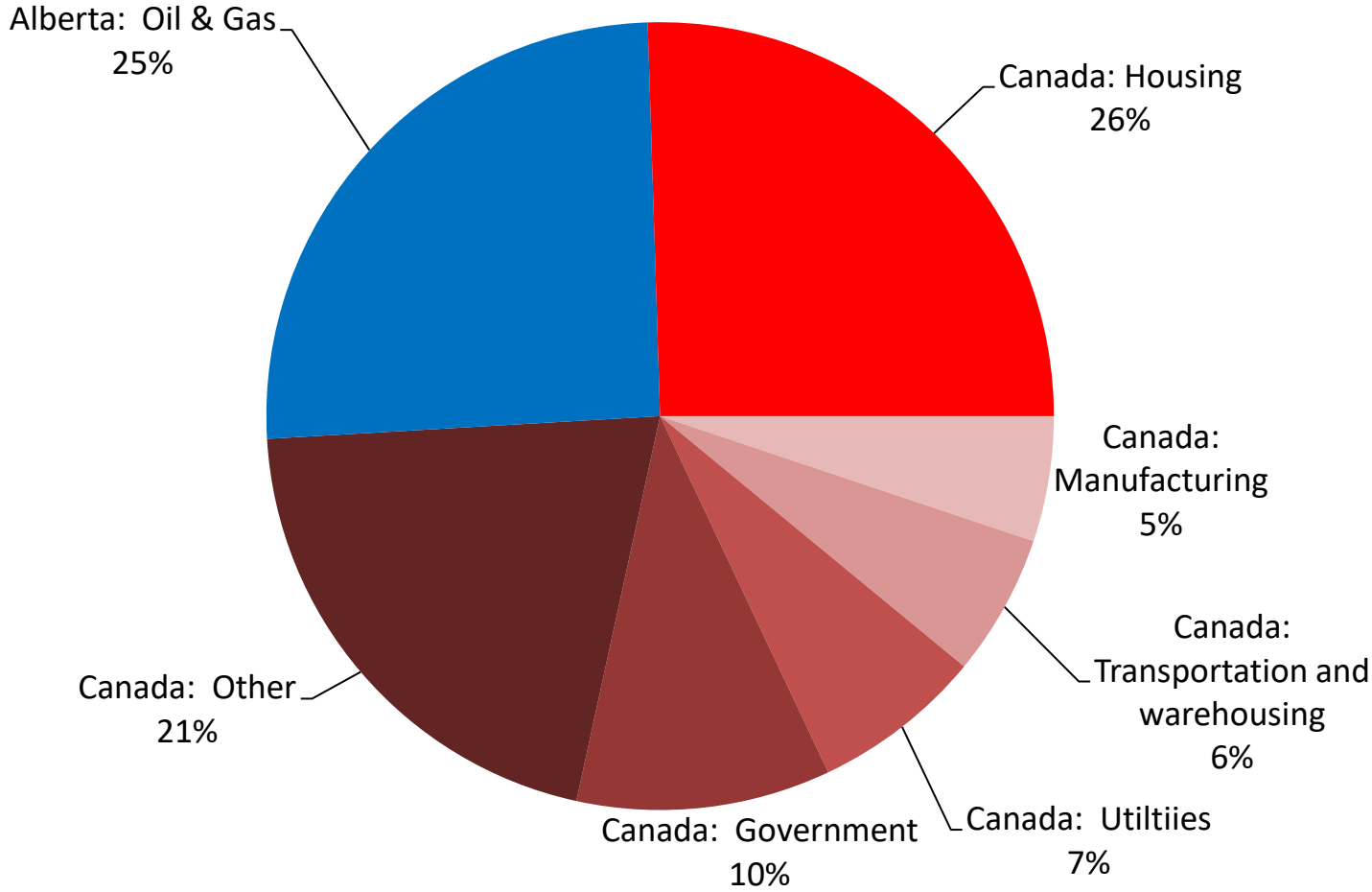
68%

51%



1. Public Perception

2012 Capital Expenditures in Canada



Mega Projects in Canada = Oil Sands in Alberta



2. Reporting Bias

- Media is prone to overstate **Oil Sands cost overruns**
- Anecdotal evidence reasons:
 - Need to secure financing
 - Regulatory framework
 - Incentive for owners to down play project size & scope
 - Base Scope Changes
 - Controversial nature of Oil Sands projects



3. Loss of Internal Capacity

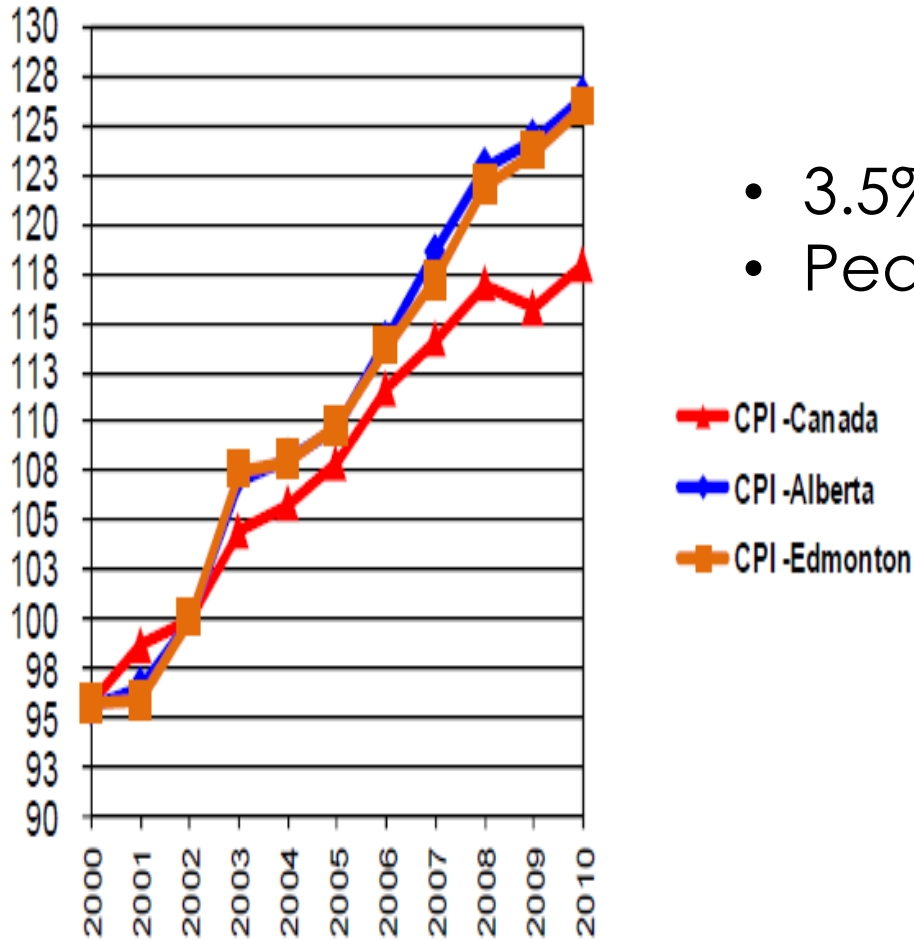
- History
 - Canadian Oil Sands 967
 - Syncrude 1977
 - NEP 1980s.....exodus of oil companies and industry professionals
 - Mid-1990swe're BACK!
- The **lack of institutional knowledge** may have led to:
 - Poor project management
 - Poor project management processes
 - Poor executive leadership
- Likely receded from its zenith
- Cost variances reputation for Oil Sands Mega Projects persist

4. Escalation

2000-2001 Escalation was

BIG

- 3.5% to 5% per year
- Peak years averaged 18%!

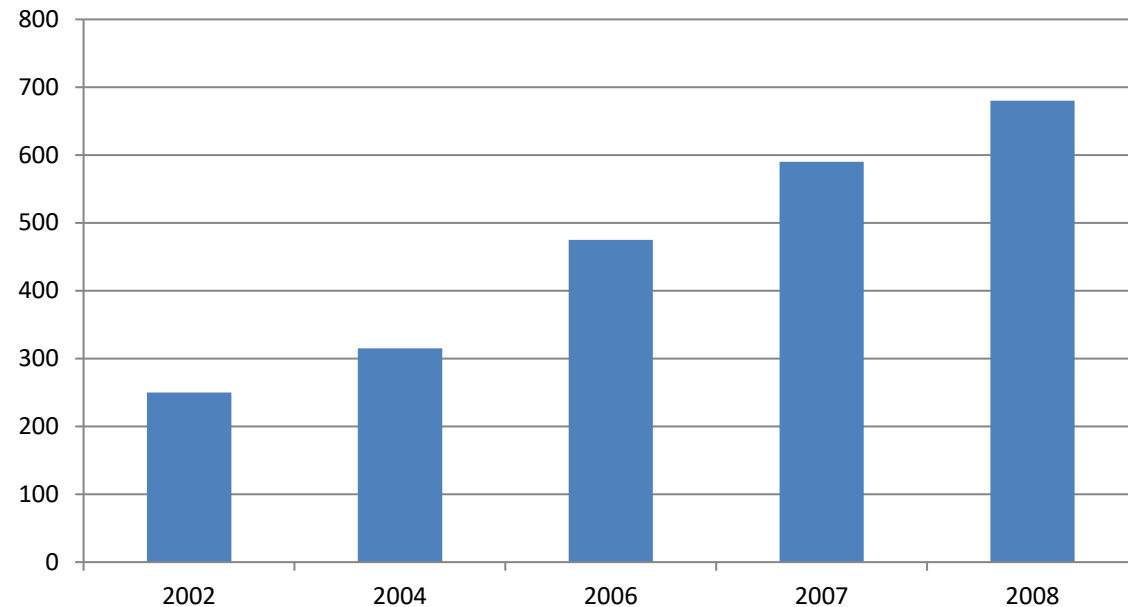


4a. Self Inflicted Escalation

Firms compounded the problem:

- Man camps
- Multiple mega projects
- Labour planning and mobility
- Bidding wars
- “Induced” economic activity of 1.6-2x

Cost of Detached Single Family Dwelling in Fort McMurray

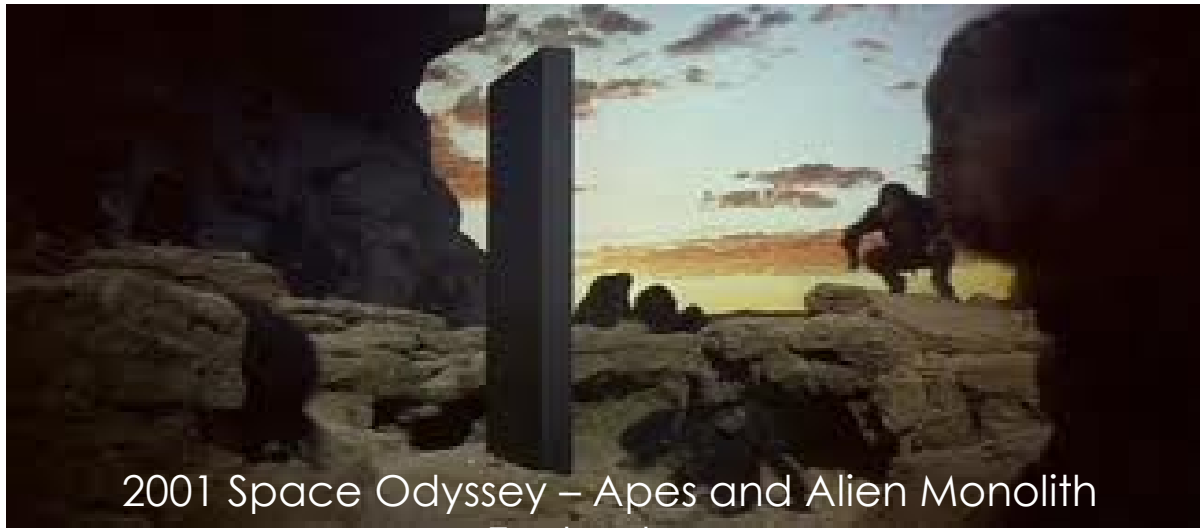


5. Frontier Culture

- Massive labour influx results in large **temporary** work force:
 - 26% of all RMWB workers are directly associated with the oil and gas
 - 25% of all O&G workers live in man-camps
 - “fly-in-fly-out” additional 25% above the resident population
- The transitory nature leads to high turnover workers
 - Lower productivity rates
 - Fluctuating productivity rates
- Mega oil sands projects may get the correct “average” labour productivity, but the inherent variability of transient labour maybe difficult to predict leading to schedule and cost overruns for many projects in RMWB

6. New Technology

- New Technology is:
 - Inherently hard to predict
 - Historically have up to 20% higher cost overruns
 - Unknown properties and impact of scaling
 - Still an issue when used in new arrangements or by a company with limited experience with technology
- Example
 - Steam-assisted gravity drainage (SAGD)
 - Leading edge-environmental



2001 Space Odyssey – Apes and Alien Monolith

7. Solid Feedstocks

Solid vs. Gas Feed Stocks:

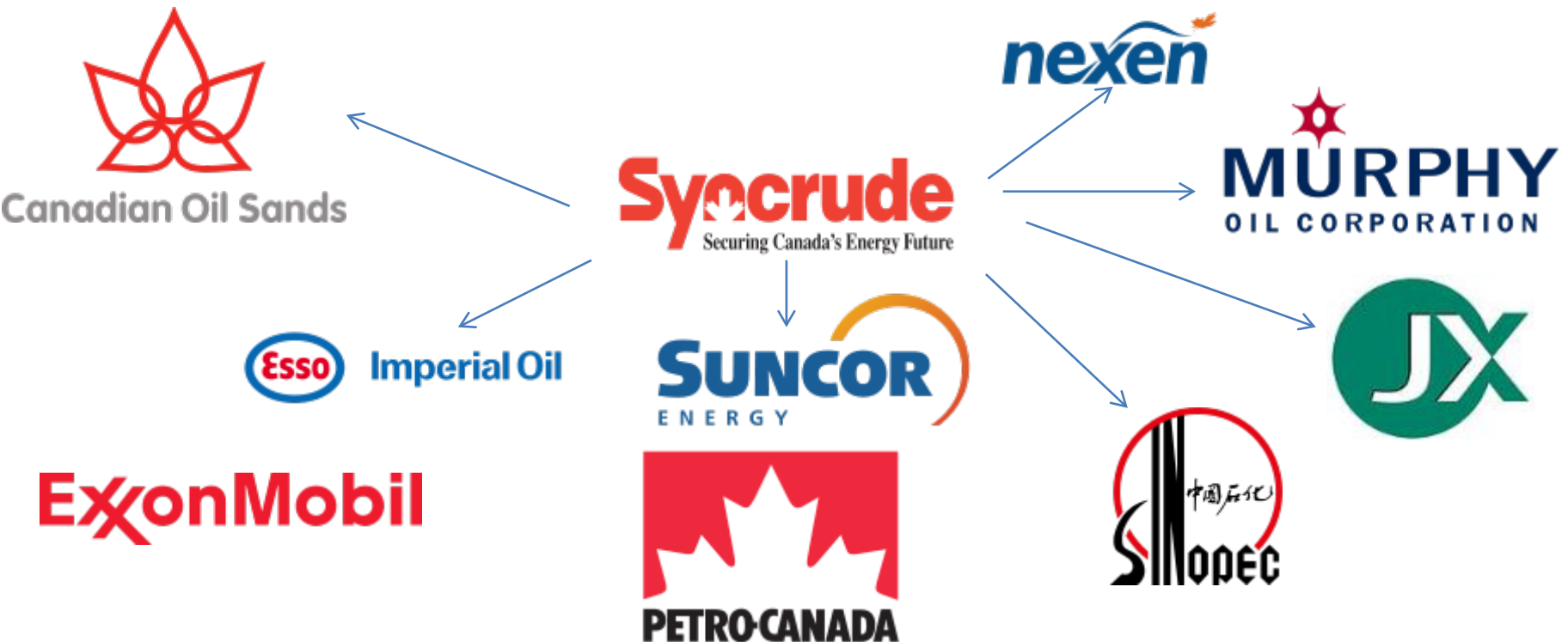
- Solid feedstock is significantly higher variability of properties making processes, heat & mass balances more difficult to estimate.
- Historically have up to 10% higher cost overruns



While the output may be “liquid”
the input sure isn’t

8. Partnering

- Sheer size of Mega Projects often results in joint-ventures
- Most Oil Sands Projects are joint Ventures
- Complex ownerships structure can increase cost overruns by 25%



Risk Factors in Alberta

Risk Driver/Factor	Typically Observed in Alberta Oil Sands Mega Projects	Observed in All Alberta Mega Projects
1. Poor FEL	X	✓
2. Failure to Forecast Escalation	X	✓
3. Regulatory Regime Challenges	X	✓
4. Use of Solid Feedstock	X	✓
5. Complex Ownership Structure (Joint Ventures)	X	✓
6. Oil and Gas Industry	X	✓
7. Loss of Internal Capacity	X	✓
8. Non-Localized Project Teams	X	✓
9. Concurrent Design & Construction	X	✓
10. Fast-Tracking Projects	X	✓

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